



KSC Institutional Services Contract



Propellants and Life Support SCAPE Suit and ECU Capability

National Space Symposium
Colorado Springs, Colorado
April 11- 14, 2011



National Space Symposium Purpose and Background



KSC Institutional Services Contract

◆ Purpose

- Demonstrate Propellant Handlers Ensemble (PHE) and Environmental Control Unit
- Promote effectiveness in protecting Propellant Technicians from IDLH environments related to propellant fueling operations
- Promote ISC Hypergol fueling support capabilities to Space Community
 - Actual fueling support
 - PHE – ECU Support to fueling operations by others

◆ Background

- 27th National Space Symposium – Colorado Springs
(<http://www.nationalspacesymposium.org/>)
 - April 11-14, 2011
- Purpose
 - International Forum on the Space Industry
 - trends, advances, policy, technologies
 - Attendees include
 - NASA, NOAA, AF Space Command, NGA, Lockheed Martin, Raytheon, SpaceX, Northrop Grumman, Romanian Space Agency, Aerianespace (see NSS Attendees list: <http://www.nationalspacesymposium.org>)



KSC Institutional Services Contract

National Space Symposium Demonstration



◆ Demonstration

- Propellant Handlers Ensemble (PHE) and Environmental Control Unit (ECU) technology and capability to be displayed at URS exhibit.



PHE with ECU



ECU



KSC Institutional Services Contract

National Space Symposium Demonstration and Logistics



◆ Demonstration and Activity

- One PHE and ECU will be on display to solicit interest
- Each day 4/11-14/2011 URS Life Support Technician will suited in PHE with ECU and be fully self-contained from 1030 – 1130 and 1230-1330
 - A Life Support Supervisor and Engineer will be available to describe capability, solicit propellant loading work and answer questions.
 - There will be no technical documents available at the conference describing construction of either PHE or ECU

◆ Logistics

- Four Life Support Personnel are proposed
 - Two Technicians, Supervisor and Manager
- Three PHE and three ECU will be sent from KSC to NSS Conference Center
- One 160 Liter Liquid Breathing Air Dewar will be shipped from KSC to NSS Conference Center
- ECU Loading
 - Will be performed at the NSS Conference Center in loading area by Life Support Technicians
 - Life Support Technicians will perform suiting and serve as backup



KSC Institutional Services Contract

National Space Symposium

PHE/ECU Specifications



- ◆ The following information would be provided in support of describing PHE capability
 - Self contained atmospheric protective ensemble
 - Butyl covered Nomex
 - For use in propellant fueling, transfer operations, spill response.
 - Can operated in two modes
 - Mobile with ECU unattached to external air source
 - 2 hr capability
 - Attached to remote air source
 - > 2hr capability user dependent
 - Chemically resistant to Hydrazine (N₂H₄), MMH, UDMH and N₂O₄
 - Available in seven sizes, user specific – interchangeable boots and gloves
 - Specifications
 - 65 lbs (29.5 kg) with ECU
 - 22 lbs (10 kg) in airline mode
 - Positive internal pressure
 - Operating environment
 - + 20° F to +110° F
 - Humidity 20% to 95% relative humidity
 - Altitude sea level to 6500 feet (14.7 psia to 11.8 psia)



KSC Institutional Services Contract

National Space Symposium

PHE/ECU Specifications



- ◆ The following information would be provided in support of describing Environmental Control Unit – ECU capability
 - Self contained portable life support system
 - Supplies
 - Conditioned breathing, ventilation, air conditioning, dehumidifying and suit pressurization to PHE
 - Construction
 - 8.5 liter liquid air Dewar, build-up coil, build-up valve, pressure regulating valve, two relief valves, vent valve, flow selector valve with low, medium and high flow rates, heat exchanger, ejector assembly, pressure indicator and outlet flex hose.
 - Dewar holds 15 lb cryogenic air
 - Cryogenic liquid air is -320 F
 - Operation
 - Vented air is warmed, expands and is distributed throughout the PHE
 - 60% flow distribution to the breathing zone
 - Specifications
 - Operational time: 2 hours
 - Total service weight fully charged: 41 lbs